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For:

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quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl [functionality] group; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E^I , E^{II} and E^{III} individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond, p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3.

16. (Twice Amended) A compound of the formula:

BX 5 1 b

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$$C = C - (CEE^{I})_{m} - (CE^{I}E^{II})_{n} - Q$$

where X" is nitrogen and X, X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, -CN, - NO_2 , $-C_2R'$, -SR', $-N_3$, $C(\mp O)NR'R''$, -NR'C(=O)R'', -C(=O)R', $-C(=O)\ThetaR'$, -OC(=O)R', -OC(=O)R'-O(CR'R''), NR''C(=O)R', -O(CR'R''), $NR''SO_2R'$, -O(CR'R''),C(=O)R', -O(CR'R"),NR'R" OC(=O)NR'R'', -NR'C(=O)O R'', $-SO_2R'$, $-SO_2NR'R''$, and $-NR'SO_2R''$, where R' and R'' are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl [functionality] group; A is O, C=O or a covalent bond; D is a suitable nonhydrogen substituent species selected from the group of substituent species for X, X' and X"; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, non-aromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and substituted non-aromatic heterocyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0,1,2 or 3; E, E', E'' and E''' individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

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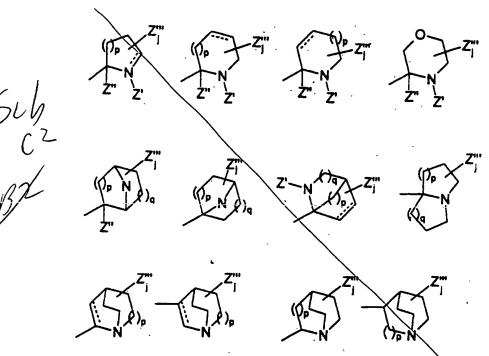
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where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3.

where X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, -CN, -NO₂, -C₂R', -SR', -N₃, C(=O)NR'R", -NR'C(=O)R", -C(=O)R', -C(=O)OR', -O(CR'R"), -O(CR'R"), -O(CR'R"), -O(CR'R"), -NR'C(=O)R', -O(CR'R"), -NR'C(=O)OR', -O(CR'R"), -NR'C(=O)OR', -SO₂R', -SO₂NR'R", and -NR'SO₂R", where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group

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consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl [functionality] group; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E', E" and E" individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

$$Z_{j}^{m} = Z_{j}^{m} = Z_{j$$

where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3, along with a pharmaceutically acceptable carrier.

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-O(CR'R''), NR''C(=O)R',

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41. (Twice Amended) A pharmaceutical composition incorporating a compound of the formula:

where X" is nitrogen\and X and X' are individually carbon bonded to a substituent species

$$Cx_{A} \times C \equiv C - (CEE^{i})_{m} - (CE^{i}E^{II})_{n} - Q$$

selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R'', $-CF_3$, $-CN_1$, $-NO_2$, $-C_2^3R'$, -SR', $-N_3$, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -C(=O)OR'-O(CR'R"),NR'R" -O(CR'R''), $C(\ge O)R'$, O(CR'R''), $NR''SO_2R'$, -OC(=O)NR'R'', -NR'C(=O)OR'', $-SO_2R'$, $-SO_2NR'R''$, and $-NR'SO_2R''$, where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl,

pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl functionality group; A is O, C=O or a covalent bond; D is a suitable non-hydrogen substituent species selected from the group of substituent species for X, X' and X"; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, non-aromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and substituted non-aromatic hetero-cyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E', E'' and E''' individually represent hydrogen or a suitable non-hydrogen substituent selected from the group

consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl,

arylalkyl and substituted arylalkyl; and Q is selected from:

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where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; arid Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3, and a pharmaceutically acceptable carrier.

51. (Twice Amended) A method for treating a central nervous system disorder associated with dysfunction of nicotinic receptors, said method comprising administering an effective amount of a compound having the formula:

$$X \longrightarrow CH = CH - \left(CEE_I\right)^m - \left(CE_IE_m\right)^n - O$$

where X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, -CN, -NO₂, -C₂R', -SR', -N₃, C(=O)NR'R", -NR'C(=O)R", -C(=O)R', -C(=O)OR', -OC(=O)R', -O(CR'R"), NR'R" -O(CR'R"), NR'C(=O)R', -O(CR'R"), NR'SO₂R', -OC(=O)NR'R", -NR'C(=O)O

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R", SO₂R', -SO₂NR'R", and -NR'SO₂R", where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl [functionality] group; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E', E'' and E''' individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

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where Z' is hydrogen, lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3.

66. (Twice Amended) A method for treating a central nervous system disorder associated with dysfunction of nicotinic receptors, said method comprising of the administration of an effective amount of a compound having the formula:

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where X" is nitrogen, X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, -CN, - NO_{2} , $-C_{2}R'$, -SR', $-N_{3}$, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', -C(=O)OR', -OC(=O)OR', -OC(=O)OR'-O(CR'R')NR'R' -O(CR'R')NR''C(=O)R', $-O(CR'R')NR''SO_2R'$, O(CR'R''),C(=O)R',OC(=O)NR'R'', -NR'C(=O)OR'', \SO_2R' , $-SO_2NR'R''$, and $-NR'SO_2R''$, where R' and R'' are individually hydrogen, lower alkyl,\cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl [functionality] group; A is O, C=O or a covalent bond; D is a suitable nonhydrogen substituent species selected from the group of substituent species for X, X' and X"; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, non-aromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and substituted non-aromatic hetero-cyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E^I, E^{II} and E^{III} individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from: